COST ESTIMATES OF ENVIRONMENTALLY RELATED DISEASES IN MONTANA

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BACKGROUND

Environmentally-related diseases affect the quality of life for the persons and families afflicted with the disease and impose significant costs to individuals and society. Years of life lost due to premature death and the lower quality of life for years spent with an environmentally-related disability measure the human costs of disease. Some of these human costs are partly captured by both the costs of health care and medical treatment and the costs of lost output and production.

Medical treatment costs are imposed on individuals, healthcare providers, insurance companies and taxpayers through government-funded health programs including Medicare and Medicaid. Lost worker productivity and losses in Gross Domestic Product are additional costs measures of disease.

Air and water pollution and other environmental problems accompanying the production of goods and services contribute to disease and death. The increased awareness and documentation of environmental health diseases makes measurement of their costs important as we formulate regulations and policies to mediate the underlying environmental hazards. Proactive policies to reduce environmental hazards in a period of political and fiscal conservatism need to demonstrate the cost savings and gains associated with such interventions.

The following, brief discussion analyzes recent data in order to identify environmentally related diseases and causes of death in Montana. Associated costs of environmentally related disease are estimated for Montana using recent national data (Centers for Disease Control, http://www.cdc.gov/nccdphp/) and national cost benchmarks developed by the California Environmental Health Tracking Program (2004).

VITAL STATISTICS IN MONTANA

Heart disease, cancer, cerebrovascular disease, and chronic lower-respiratory disease accounted for 60 percent of Montana's 8,473 total deaths in 2002. These major causes of Montana deaths (Table 1) include cancer, one of the most important diseases related to environmental factors (R. Montesano and J. Hall ,2001).

Loss of life from different diseases measured by years of potential life lost before age 75 represent a measure of the burden or loss for specific diseases. Years of potential life lost (YPLL) before age 75 as a result of a particular cause of death is the sum of the years that all persons who died from the disease would have lived had they reached the age of 75 based on their age at the time of death. .

YPLL emphasizes premature, preventable, and unnecessary mortality and is a human life measure in contrast to dollar cost measures of medical treatment and lost productivity. As a burden or loss measure YPLL offers another perspective on diseases as a source of poor health and death.

Although heart disease is the most frequent cause of death both the total and average years of potential life lost for heart disease are not the highest compared to other disease categories. Cancer deaths show a much a larger total and average years of potential life lost suggesting a higher incidence of this cause of death in younger age categories compared to heart disease. Accidents, a major cause of death among younger people, has the highest total and average years of potential life lost although its frequency (523 deaths) is only about one fourth the frequency of either heart disease or cancer deaths.

TABLE 1: NUMBER OF DEATHS AND YEARS OF POTENTIAL LIFE LOST (YPLL) BEFORE AGE 75 BY THE 10 LEADING CAUSES OF DEATH, MONTANA 2002

DISEASES	DEATHS	YPLL	YPLL PER DEATH
Total	**8,473**	**65,180**	**7.7**
Heart Disease	1,931	8,660	4.5
Cancer	1,901	13,314	7.0
Cerebrovascular Disease	638	1,402	2.2
Chronic Lower-Respiratory Disease	573	1,571	2.7
Accidents	523	13,485	26.5
Alzheimer's	284	150	.5
Pneumonia/Influenza	254	838	3.3
Diabetes	211	1,415	6.7
Suicide	182	5,500	30.2
Chronic Liver Disease	124	2,152	17.5
All Other Causes	1,852	16,733	9.0
Source: Montana Vital Statistics, 2002			

Although the number of suicides in Montana is small, the high incidence of suicides in young age categories is reflected in a high number of years of potential life lost before age 75. Years of potential life lost was equal to 5,500 years in 2002. Alzheimer's disease which had 102 more deaths than suicide had an extremely low average years of life lost, a result consistent with Alzheimer's higher prevalence among the very old.

Average years of potential life lost represent the relative burden or loss of different diseases. In Montana, suicides, accidents, and chronic liver disease all have the highest average years of life lost before age 75 compared to major causes of death such as heart disease and cancer.

ENVIRONMENTALLY RELATED DISEASES

Diseases are multi-factorial, resulting from a mixture of environmental, lifestyle, socioeconomic, and genetic factors over a person's life time. And while it is difficult to separate or weight these different factors it is possible to identify specific elements within each factor that affect a population's health and longevity. Environmental factors have long been known to affect health although the specific elements feeding into these factors have only recently between more clearly identified.

The California Environmental Health Tracking Program identifies (www.catracking.com) research that either supports or suggests association between exposure to categories of environmental hazards and candidate diseases. Environmental hazards that affect disease include chemicals comprised of metals, pesticides, organic pollutants and compounds. Other hazards include air pollution (indoor and outdoor), water pollution, and job or occupation related environmental hazards.

Chronic diseases such as cancer and its different forms have been associated with every element within the two major classes of environmental hazards. Reproductive outcomes in the form of various birth defects are also associated with all elements in the two major hazard classes. Heart disease and stroke is more closely associated with outdoor air pollution, and occupation environmental media.

Some diseases such as asthma and lead poisoning are more prevalent in early childhood and carry through adult years in terms of respiratory, kidney, and other chronic health problems. Asthma has been linked to pesticides, organic pollutants and different forms of pollution including air, indoor, and occupation. Lead poisoning is associated with metals, smelting and exposure to lead-based paint (www.catracking.com).

COSTS OF MONTANA'S ENVIRONMENTALLY RELATED DISEASES

Montana does not regularly measure and track the costs of environmentally related diseases. Since state level estimates are not available this report uses outside sources such as national data and estimates from other states using national data. The different cost estimates are based on both the direct medical costs and lost productivity costs in relation to estimated prevalence rates for the disease category.

The 'environmental attributable fraction' is a key parameter in the link between the environment and disease. The 'environmental attributable fraction' is the percentage of a particular disease category that would be eliminated if environmental risk factors were reduced to their lowest feasible levels. Attributable fractions ranged from 100% in the case of child lead poisoning to 30% for asthma, and a range of 5 to 10 to 20 percent for neurobehavioral disorders. Adult cancers of all types have an attributable fraction in the range of 20 percent (California Environmental Health Tracking, 2002; Montesanto and Hall, 2001; Landrigan, et. al., 2002).

American Cancer Society overall cost estimates of cancer (Centers for Disease Control, http://www.cdc.gov/nccdphp/) for the U.S. in 2002 were modified for Montana by a) updating the $170 billion [$110 billion for lost productivity and $60 billion for direct medical costs] to 2003 using 7.1 percent increase in national health care spending between 2002 and 2003; b) applying the 20% environmental attributable fraction; and c) taking Montana share of U.S. population, a value of .3% [decimal form=.003]as a benchmark for deriving the state share of the $36.4 billion in national 2003 cancer costs. The $109.2 million estimate for Montana is shown in Table 2.

National cost estimates for the environmental related childhood diseases (California Policy Research Center, 2004; Landrigan, et. al. 2004) were modified using a population share approach for child lead poisoning, asthma, neurodevelopment disorders, and birth defects. Montana's share of national populations in childhood age cohorts [.3% which is the same as Montana's share of overall national population] were applied to the national cost estimates of environmentally related childhood diseases.

2003 Montana costs for the environmentally related childhood diseases are shown in Table 2. Lead poisoning costs were $188.9 million and represented one of the most costly of environmentally related childhood diseases. The high costs of lead poisoning are partly due to the maximum value for the attributable fraction of 100%, based on environmental factors being the primary and virtually sole source of this disease. The 100% fraction almost means that child lead poisoning is entirely preventable if enough resources would be focused on appropriate intervention policies.

TABLE 2: ESTIMATED COSTS OF ENVIRONMENTALLY RELATED DISEASES IN THE U.S. AND IN MONTANA, 2003

Disease	2003 National Costs	2003 Montana Costs
Child Lead Poisoning	$63 billion	$188.9 million
Childhood Asthma	$2.9 billion	$8.7 million
Neurodevelopment Disorders	$13.5 billion	$40.5 million
Birth Defects	$19.1 billion	$57.3 million
Cancer	$36.4 billion	$109.2 million
TOTAL	**$134.9 billion**	**$404.6 million**

Source: Centers for Disease Control, http://www.cdc.gov/nccdphp/; California Policy Research Center, www.ucop.edu/cprc .

The costs of other environmentally related childhood diseases were also significant. Birth defects had $19.1 billion in costs nationally and $57.3 million in Montana. The costs of neurodevelopment disorders in Montana were $40.5 million and childhood asthma were $8.7 million.

Total estimated costs of environmentally related diseases in Montana were $404.6 million, a measure reflecting health care costs statewide and lost productivity costs in the Montana economy. The more than $400 million in cost impacts to Montana could be avoided by prevention programs targeted on the underlying environmental factors contributing to the diseases in Table 2.

The absolute dollar costs of $404.6 million can be benchmarked on total health care spending in the state using estimates by Seninger (2004, www.bber.umt.edu) of $4.3 billion in total 2003 Montana spending on healthcare. The costs of environmentally related disease represent about 10% of total spending on healthcare in Montana.

SOURCES

California Policy Research Center, University of California-Berkeley, (2004). <u>Strategies for Establishing and Environmental Health Surveillance System in California: A Report of the SB 702 Expert Working Group</u>,   www.ucop.edu/cprc

California Environmental Health Tracking Program, www.catracking.com

Centers for Disease Control, http://www.cdc.gov/nccdphp/

P. Landrigan, C. Schechter, Jeffrey Lipton, Marianne Fahs, and Joel Schwartz, (2002) "Environmental Pollutants and Disease in American Children: Estimates of Morbidity, Mortality, and Costs for Lead Poisoning, Asthma, Cancer, and Developmental Disabilities," <u>Environmental Health Perspectives</u>, vol. 100, #7 (July), 721-728.

2002 Montana Vital Statistics, www.dphhs.state.mt.us/about_us/divisions/operations_technology/vital_statistics.htm

R. Montesano and J. Hall (2001), "Environmental Causes of Human Cancers<u>, European Journal of Cancer</u>, vol. 37 [Supplement 8] S67-S87.